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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/554,307	10/21/2005	Michael Zenge	PHDE030132US	2650

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595 MINER ROAD  
CLEVELAND, OH 44143

EXAMINER
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COOK, CHRISTOPHER L

ART UNIT	PAPER NUMBER
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4138

MAIL DATE	DELIVERY MODE
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10/14/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/554,307	<b>Applicant(s)</b> ZENGE ET AL.	
	<b>Examiner</b> CHRISTOPHER COOK	<b>Art Unit</b> 4138	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10/21/2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/21/2005</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because they do not have a legend or define the axes on any of the figures. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

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### **Arrangement of the Specification**

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
  - (1) Field of the Invention.
  - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

2. The disclosure is objected to because of the following informalities: Applicant is reminded not to recite claim numbers in the specification (Page 4, Lines 9-11).

Also, it is suggested that the applicant identifies the different sections of the specification with the appropriate heading.

Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-18 and 20 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim 20 is merely directed to a computer program for carrying out the improper method as addressed above. A computer program is considered subject matter ineligible for patenting. See MPEP § 2106.01.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-18 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-18 provide for the use of a magnetic resonance method for locating interventional devices, in particular in vivo, but, since the claim does

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not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

6. Claim 15 recites the limitation the processed measured signals in line 5 . There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, 4, 8, 16, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,868,674 to *Glowinski et al.*

As to Claim 1, *Glowinski* discloses a magnetic resonance method for locating interventional devices, in particular, in vivo (Abstract), in which the interventional device bears a marking (Column 2, Lines 33-37, Also, 31 in Fig 3), which in the magnetic resonance acquisition influences the measured signals or generates its own measured signals, wherein the measured signals are processed by means of a one-dimensional signal processing method (Column 6, Lines 30-39).

As to Claim 2, *Glowinski* discloses a method wherein the one-dimensional signal processing method is an iterative method (Column 6, Lines 30-41).

As to Claim 4, *Glowinski* discloses a method wherein, for artefacts occurring in the measured signals, model functions are formed, adapted and subtracted from the measured signals as the iterative method is carried out (Column 2, Lines 63-67 and Column 3, Lines 1-15).

As to Claim 8, *Glowinski* discloses a method wherein the measured signals recorded when the marking on the interventional device is inactive is used as a model function (Column 6, Lines 30-39).

As to Claim 16, *Glowinski* discloses a method wherein a number of measured signals being used to locate the interventional device are processed jointly in the one-dimensional signal processing method (Column 3, Lines 31-40).

As to Claim 19, *Glowinski* discloses an apparatus for locating interventional devices with the aid of magnetic resonance acquisition (Abstract, Lines 1-4), in which the interventional device bears a marking (Column 2, Lines 33-37, Also, 31 in Fig 2) which in the magnetic resonance acquisition influences the measured signals or generates its own measured signals (Column 5, Lines 58-67, Also, Column 6 Lines 1-15) wherein the apparatus has a program control for carrying out a method as previously addressed in Claim 1 above.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Patent No. 5,868,674 to *Glowinski et al.* in view of Publication "Maximum entropy algorithm applied to image enhancement" to Daniell et al.

As to Claim 3, *Glowinski* discloses a magnetic resonance method for locating interventional devices, as described above in Claim 1. *Glowinski* also discloses a method wherein the one-dimensional signal processing method is an iterative method (Column 6, Lines 30-41).

*Glowinski* does not expressly disclose that the iterative method is based on the maximum entropy method.

Daniell teaches a one dimensional signal processing method which is based on the maximum entropy method (Title).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the iterative method disclosed by *Glowinski* to determine the maximum entropy of the data set as described in *Daniell* to improve the localization of an interventional device.

11. Claims 5, 6, 7, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,868,674 to *Glowinski et al.* in view of U.S. Patent No. 6,094,050 to *Zaroubi et al.*



As to Claim 5 and 9, *Glowinski* discloses a magnetic resonance method for locating interventional devices as previously addressed above in Claims 1 and 4.

*Glowinski* does not expressly provide a method wherein the model functions are adapted to the recorded measured signals by way of a scaling parameter. Furthermore, *Glowinski* does not expressly disclose a method wherein rectangular or Gaussian functions are used as model functions.

*Zaroubi* teaches model functions which are adapted to recorded measured signals by way of a scaling parameter (Abstract, Lines 1-8). Moreover, *Zaroubi* teaches rectangular or Gaussian functions being used as model functions (Column 7, Lines 54-60).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the model functions of *Glowinski* with a scaling parameter and rectangular or Gaussian functions described in *Zaroubi* to minimize noise in the data acquisition and improve the localization of an interventional device.

As to Claim 6, *Glowinski* discloses a method wherein the model functions are adapted a new to the recorded measured signals after each iteration step in the iterative method (Column 6, Lines 16-41).

As to Claim 7, *Glowinski* discloses a method wherein the model functions are adapted to the recorded measured signals once, before the iterative method is carried out (Column 6, Lines 16-29).

12. Claims 10-15, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,868,674 to *Glowinski et al.* in view of U.S. Patent No. 5,939,884 to *Goldfarb et al.*

As to Claims 10 and 11, *Glowinski* discloses a magnetic resonance method for locating interventional devices as previously addressed above in Claims 1, 2 and 4.

*Glowinski* does not expressly disclose a method where the mean value of the difference between measured signal and model function is selected as the start value for iteration. Furthermore, *Glowinski* does not expressly describe a method wherein the mean value of the measured signal is selected as the start value for the iteration.

*Goldfarb* teaches a method using the mean value of the difference between measured signal and model functions being used as the start value for the iteration (Column 3, Lines 38-61). Likewise, *Goldfarb* teaches a method wherein the mean value of the measured signal is selected as the start value for the iteration (Column 3, Lines 31-61).

*Goldfarb* and *Glowinski* are analogous art because they are from the same field of endeavor with respect to eliminating and/or detecting certain attributes in signals during a signal processing method.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the model functions of *Glowinski* to use the

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mean value for the start value for iterations as described by *Goldfarb* to minimize noise in the data acquisition and improve the localization of an interventional device.

As to Claims 12-14, *Glowinski* discloses a magnetic resonance method for locating interventional devices as previously addressed in Claim 1.

*Glowinski* does not expressly disclose a method where high/low frequency signal fractions are eliminated in order to suppress noise and/or artefacts in the recorded measured signals. Furthermore, *Glowinski* does not expressly describe a method wherein a filter with a finite or infinite impulse response is used as a one-dimensional signal processing method. Moreover, *Glowinski* does not expressly provide a method wherein the filter is a Weiner filter or a bandpass filter.

*Goldfarb* teaches a method where high/low frequency signal fractions are eliminated in order to suppress noise and/or artefacts in the recorded measured signals (Column 3, Lines 8-14). *Goldfarb* also teaches a method wherein a filter (bandpass) with a finite or infinite impulse response is used as a one-dimensional signal processing method (Column 3, Lines 8-14, Also, Fig 2 and 4).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the model functions of *Glowinski* with a band pass filter to eliminate high/low frequency signal fractions and suppress noise as

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described in *Goldfarb* to minimize noise in the data acquisition and improve the localization of an interventional device.

As to Claim 15, *Glowinski* discloses a magnetic resonance method for locating interventional devices as previously addressed in Claim 1.

*Glowinski* does not expressly disclose a method wherein after the processing of measured signals by means of a one-dimensional signal processing method a check as to coincidence of the positions of the interventional device is determined by way of the processed measured signals.

*Goldfarb* teaches a method wherein after the processing of measured signals by means of a one-dimensional signal processing method a check as to coincidence of the positions (Column 4, Lines 7-34).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the magnetic resonance method for locating interventional devices of *Glowinski* with a method wherein after the processing of measured signals by means of a one-dimensional signal processing method a check as to coincidence of the positions as described in *Goldfarb* to improve the localization of an interventional device by checking the positions of an interventional device

As to Claim 18, *Glowinski* discloses a magnetic resonance method for locating interventional devices as previously addressed in Claim 1.

*Glowinski* does not expressly disclose a method wherein the one-dimensional signal processing method calculates the correlation of one or more measured signals.

*Goldfarb* teaches a method wherein the one-dimensional signal processing method calculates the correlation of one or more measured signals (Column 3, Lines 31-61, Also, Fig 4). It is known in the art that in order to calculate the correlation of a data set, one must determine the expected value (mean or average) and standard deviation. *Goldfarb* determines both parameters as mentioned above.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the magnetic resonance method for locating interventional devices of *Glowinski* with a method to calculate the correlation of one or more measured signals.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,868,674 to *Glowinski et al.* in view of Publication "Catheter Tracking Using Continuous Radial MRI" to *Rasche et al.*

As to Claim 17, *Glowinski* discloses a magnetic resonance method for locating interventional devices as previously addressed in Claim 1.

*Glowinski* does not expressly disclose a method wherein the measured signals are recorded in parallel by a number of receiving coils.

*Rasche* teaches a method wherein the measured signals are recorded by a number of receiving coils (Column 2, Method, Lines 21-24).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the magnetic resonance method for locating interventional devices of *Glowinski* with a method to measure signals in parallel by a number of receiving coils as disclosed by *Rasche* in order to minimize noise in the data acquisition and improve the localization of an interventional device.

13. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,868,674 to *Glowinski et al.*

As to Claim 20, *Glowinski* discloses a magnetic resonance method for locating interventional devices, in particular, in vivo (Abstract), in which the interventional device bears a marking (Column 2, Lines 33-37, Also, 31 in Fig 2), which in the magnetic resonance acquisition influences the measured signals or generates its own measured signals, wherein the measured signals are processed by means of a one-dimensional signal processing method (Column 6, Lines 30-39).

*Glowinski* does not expressly disclose a computer program to carry out the method described above.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art that a computer program was utilized to carry out the

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method described above in order to improve the localization of an interventional device with magnetic resonance.

***Conclusion***

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No 5,578,923 to Chen discloses a technique to reduce noise with a Weiner filter and linear prediction.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER COOK whose telephone number is (571)270-7373. The examiner can normally be reached on M-F 8-5 (Every other Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melba Bumgarner can be reached on (571)272-4709. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Art Unit 4138

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